1. **Research Title:** Innovative Active Flow Control for Aircraft Aerodynamics Enhancement

2. **Individual Sponsor:**

> Ryan Plumley, AFRL/RQVA
> 2145 5th Street, Bldg 24C,
> WPAFB, OH 45433-7333
> ryan.plumley@us.af.mil

3. **Academic Area/Field and Education Level**
   Aerospace Engineering and Mechanical Engineering (MS or PhD level)

4. **Objectives:** Research and develop Active Flow Control (AFC) technology applications for the enhancement of Air Force aircraft aerodynamics. Potential applications for AFC solutions include: control of air refueling booms, wing separation control, fighter-type aircraft stability and control improvements, and the inclusion of AFC technologies at the conceptual design stage. Explore technology modeling at the right level of fidelity for the flow control device and aircraft aerodynamics to identify and develop relevant solutions.

5. **Description:** Based on progress in AFC in both device development and maturing applications, there is renewed interest in the understanding of potential AFC enhancements to Air Force aircraft aerodynamics. The most likely candidates for enhancement would be new aircraft developments, but opportunities to impact legacy systems may exist. Uses of the technology in aerodynamic design include the delay of flow separation for wing or control surfaces, flow control applied to an aerial refueling boom, and other applications for military aircraft. There is a need to better understand the effectiveness and costs of using AFC for a given application. Initial steps require establishing expected performance and requirements for AFC devices and then showing potential beneficial and detrimental impacts at a system level.

   As design and analysis work progresses and AFC benefits are quantified, experimental testing can be used for modeling validation and to mature in Technology Readiness Level (TRL) for the application. Wind tunnel facilities operated by AFRL/RQV, including the Subsonic Aerodynamic Research Lab (SARL), are candidates to develop and execute generalized AFC experiments.

6. **Research Classification/Restrictions:** This research unclassified.

7. **Eligible Research Institutions:** All DAGSI Universities

PA Approval #88ABW-2018-3709